e-Front runners

FUJI ELECTRIC

FUJI Air Circuit Breakers

New DH series

Fuji Electric FA Components & Systems Co., Ltd.

EEH604

■Variation

Rated current [A]		800A	1250A	1600A	2000A	2500A	3200A	4000A
Rated Breaking capacity(kA sym.)/ Rated making current(kA peak) IEC EN AS [Ics=Icu]	Rated Voltage 690VAC	50/105				65/143		75/165
			55/121					
				85/187				
	Rated Voltage 440VAC	65/143				85/187		100/220
			80/176					
				100/220				

: DH series : DH-H series : DH-P series

■Based Standards

JIS C8372..... Japanese Industrial Standards
(New JIS C8201-2 is also supported)
IEC60947-2..... International Electrotechnical Commission
EN60947-2..... European Standard
AS 3947-2..... Australian Standard
NEMA PUB NO.SG3..... National Electrical Manufactures Association
ANSI C37.13..... American National Standard Institute

■Certification and Authorization

ASTA, UK..... ASTA Certification Service
NK, Japan..... Nippon Kaiji Kyokai
LR, UK..... Lloyd's Register of Shipping
ABS, USA..... American Bureau of Shipping
GL, Germany..... Germanischer Lloyd
BV, France..... Bureau Veritas

CONTENTS

1. Features 3
2. Specifications and Ratings 6
Standard types 6
High breaking types 7
3. Type number nomenclature 8
4. Characteristics of overcurrent trip device 10
5. Dimensions 11
6. Wiring diagrams 14
7. Accessories 16

Features

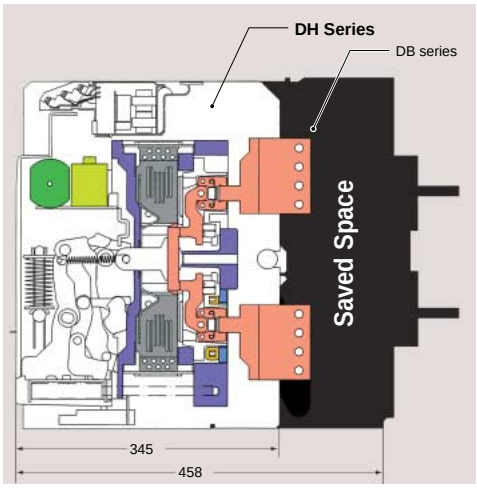
The ultimate in compactness and operational capability

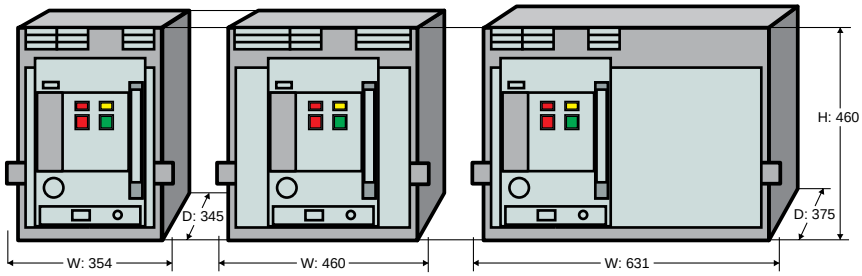
Geared toward the smallest depth in the world

Direct connection of the isolating main contacts to the hinges of the fixed main contacts eliminates the need for intermediate conductors. Allowing the DH series ACBs have the world's smallest depth resulting in space saving in switchboards.

More than twenty design patents have been registered for the **DH series ACB.**

The height and depth dimensions are identical in all sizes to 3200A. There are two common widths or frame size, from 800-2000A and from 2500-3200A for the standard series. The panel cutout size is the same for all types of DH series ACB, which makes it easy to arrange the ACBs in switchboards.
Maximum power from minimum volume was central to the design specification. With a depth of 290mm for the fixed type and 345mm for draw-out, it is one of the smallest ACBs in the world.
ACBs with front connections are available off-the-shelf.
Front connections are especially suitable for smaller-depth switchboards



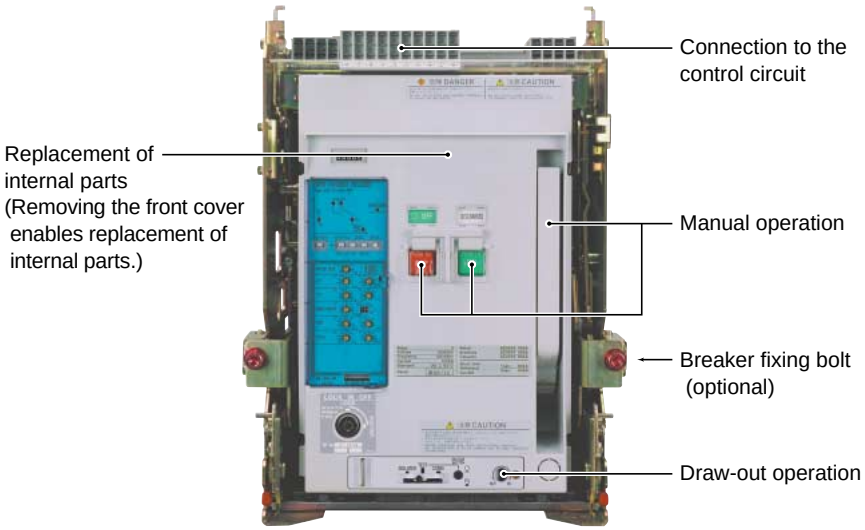


Standard type 800~2000A	2500~3200A	4000A
High breaking type 1250~2000A	1600~3200A	

Increased accessibility from the front

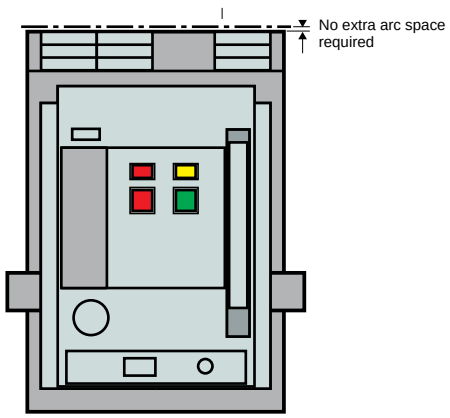
It enhances ease of installation, operation, and maintenance.

The double insulated design ensures that most accessories can be safely and easily, installed by the user. Control, auxiliary and position switch terminals are mounted at the front on the ACB body for easy access. Due to the increased level of harmonics within the distribution network, the neutral phase is fully rated as standard.


Connection to the control circuit
Replacement of internal parts (Removing the front cover enables replacement of internal parts.)
Manual operation
Breaker fixing bolt (optional)
Draw-out operation

No extra arc space required, vertical stacking permitted

The **DH series ACB** dissipates all arc energy within its unique **"Double Break"** arc chamber. The internal energy dissipation within the ACB allows the clearance distance of the ACB to nearby earthed metal to be zero. This will assist in minimizing switchboard height and costs.

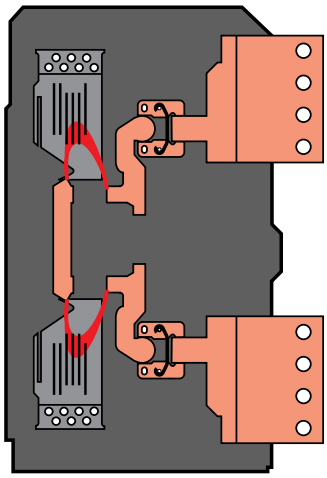


Features

A high performance and reliability

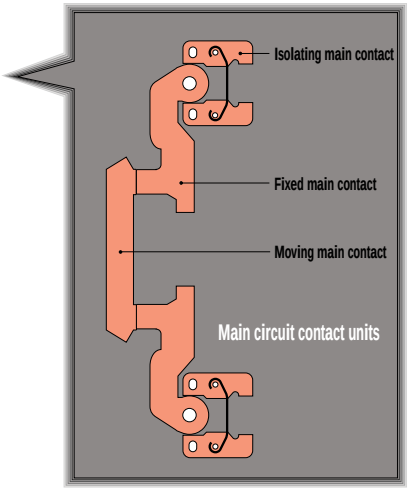
Very fast interruption by "Double Break" system

The unique **"Double Break"** main contact system ensures extremely fast interruption of short circuit currents and substantially reduces main contact wear. The internally symmetrical **"Double Break"** structure allows reverse power connection.



No clamp screws used for the main circuit contact units

There are no clamp screws or flexible leads in the main circuit contact units.
This substantially enhances the durability of the main circuit contact units and improves the reliability in ON-OFF operation.

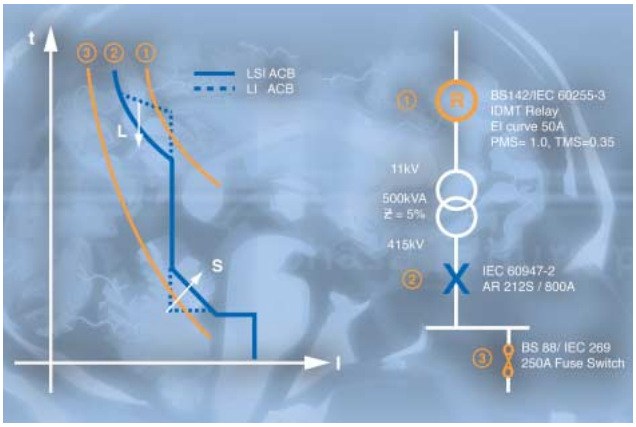


Enhanced selectivity

At Fuji we are so concerned about selectivity that all our protection relays have 'LSI' characteristics as standard.

This provides an adjustable time delay on overload (L) and also the I2t ramp characteristic (S).
As shown, these are essential to provide selectivity when grading with other protective devices such as downstream fuses and upstream relays.
The standard 'LSI' curve provides more than five million combinations of unique time current characteristics.
Zone selective interlocking is available to provide zero time delay selectivity.
As the rated breaking capacity is identical to the rated short-time withstand current full selectivity can be achieved.

L Long time delay
S Short time delay
I Instantaneous



Performance	Type and rated current	DH08 800A DH12 1250A DH16 1600A DH20 2000A	DH12H 1250A DH16H 1600A DH20H 2000A	DH25 2500A DH30 3200A	DH16P 1600A DH20P 2000A DH25P 2500A DH30P 3200A	DH40 4000A
Rated breaking current (at AC440V)	With INST trip function With ST delay trip function (Without INST trip/MCR functions)	65kA	80kA	85kA	100kA	100kA
Rated short-time withstand current (for 1 sec.)						

Features

For general feeder circuits (L-characteristic)
For general feeder circuits (R-characteristic)
For generator protection (S-characteristic)

FUJI ACB provides positive protection for electric power systems.

The Fuji ACB DH series is equipped with an RMS sensing over-current release (OCR) having a wide range of protection functions and capabilities.

Optimum protective coordination

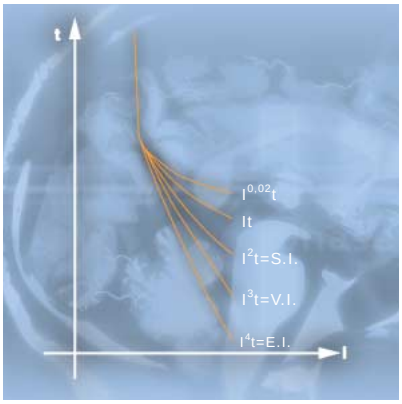
Why use a separate panel mounted protection relay when you can have all the benefits of I.D.M.T. protection integral to the ACB?

Fuji ACB is available with a choice of flexible protection curves to assist in selectivity applications.

S.I. Standard Inverse
V.I. Very Inverse
E.I. Extremely Inverse
All these curves are user definable and comply with IEC 60255-3. Standard transformer and generator protection characteristics are also available.

AGR-L Industrial & transformer protection
AGR-S Generator protection
AGR-R Characteristics to IEC 60255-3

Inverse Definite Minimum Time (I.D.M.T.)



Standard OCR with adjustment dial Type AGR-11.

Enhanced OCR with adjustment dial Type AGR-21.

Overload protection

Adjustable from 40–100% of rated current. True r.m.s detection up to the 19th harmonic, a distant vision for the competition who rarely see past the 7th. Neutral protection for all those Triple-N harmonics, such as 3rd, 9th and 15th. Also in case we forgot to mention, a "thermal memory" as standard!

Two channel pre-trip alarm function (S-characteristic) ✻1

This function can be used to monitor and switch on additional power backup to feed critical circuits. For example, the function can be set so that when a pre-trip alarm is activated, an emergency generator starts to ensure a constant supply. This feature is only available on some AGR21 OCR models with a generator "S" characteristic.

N-phase protection function (optional)

In 3-phase, 4-wire systems that contain harmonic distortion, the 3rd harmonic may cause large currents to flow through the neutral conductor. The N-phase protection function prevents the neutral conductor from sustaining damage or burnout due to these large currents. Available in all OCRs except for generator "S" characteristic types.

Reverse power trip function (S-characteristic) ✻1

(The first-ever feature for ACBs)

This feature provides additional protection when paralleling generators. The AGR21 OCR for generator protection with the reverse power trip function, negates the need for installation and wiring in an external reverse power relay. This feature is available using an AGR21 OCR with a generator "S" type characteristic only.

Earth leakage trip function (L/R-characteristic) ✻1

Used in conjunction with an externally mounted Zero phase Current Transformer (ZCT), this function provides protection against leakage to earth of very small levels of current. Trip or alarm indication, and contact output is available to enhance the level of system protection. Available using general purpose L / R -characteristic AGR21 OCR.

Adjustable undervoltage trip function UVT ✻1

Available as a fixed type, or with adjustable voltage pick up and an adjustable time delay. 3 Phase, Phase failure protection is also available. AGR11/21 OCR's.

Contact temperature monitoring function (optional) ✻2

This function monitors the temperature of the ACBs main contacts. An alarm indicates when the temperature exceeds 155°C. Continuous monitoring of the contact temperature provides valuable input for preventative and predictive maintenance programs.

✻1: Not available for standard OCRs, type AGR-11.
✻2: Available for type AGR-21 OCR only.

DH series standard types
Specifications and ratings

■ Specifications, standard types

Frame size		800A		1250A		1600A		2000A		2500A		3200A		4000A	
Basic type		**DH08 □■**		**DH12 □■**		**DH16 □■**		**DH20 □■**		**DH25 □■**		**DH30 □■**		**DH40 □■**	
No. of poles *2		3	4	3	4	3	4	3	4	3	4	3	4	3	4
Rated current (A) *1	IEC, EN, AS	800		1250		1600		2000		2500		3200		4000	
	JIS	800		1250		1600		2000		2500		3200		3700	
	NEMA, ANSI	800		1250		1540		2000		2500		3200		3700	
	NK, LR, AB, GL, BV	800		1250		1600		2000		2500		3200		4000	
Rated current of the neutral pole (A)		800		1250		1600		2000		2500		3200		4000	
Rated primary current of overcurrent tripping device (I_{CT}) (A) For general feeder circuit use		200 400 800		400 800 1250		400 800 1250 1600		400 800 1250 1600 2000		2500		3200		4000	
Rated primary current of overcurrent tripping device (I_n) (A) For generator protection use I_n: Generator rated current		100 ≦ I_n ≦ 200 200 < I_n ≦ 400 400 < I_n ≦ 800		200 ≦ I_n ≦ 400 400 < I_n ≦ 800 630 < I_n ≦1250		200 ≦ I_n ≦ 400 400 < I_n ≦ 800 630 < I_n ≦1250 800 < I_n ≦1600		200 ≦ I_n ≦ 400 400 < I_n ≦ 800 630 < I_n ≦1250 800 < I_n ≦1600 1000< I_n ≦ 2000		1250 ≦ I_n ≦ 2500		1600 ≦ I_n ≦ 3200		2000 ≦ I_n ≦ 4000	
Rated insulation voltage (U_i) (V, 50/60Hz) *3		1000		1000		1000		1000		1000		1000		1000	
Rated operational voltage (U_e)(V, 50/60Hz)*4		690		690		690		690		690		690		690	
Fixed type **P**		●		●		●		●		●		●		–	
Draw-out type with cradle **X**		●		●		●		●		●		●		●	
Draw-out type with cradle and shutter **Q**		●		●		●		●		●		●		●	
Main circuit terminal connection		horizontal						vertical							
Mass (kg) For draw-out type X		73	86	73	86	76	90	79	94	105	125	105	125	139	176
Rated breaking capacity (kA, sym.)/ Rated making current (kA, peak)															
IEC, EN, AS [I_{CS}=I_{CU}]	690V AC	50/105		50/105		50/105		50/105		65/143		65/143		75/165	
	440V	65/143 (500V)		65/143 (500V)		65/143 (500V)		65/143 (500V)		85/187 (500V)		85/187 (500V)		100/220 (500V)	
NEMA, ANS	600V AC	42/96.6		42/96.6		42/96.6		42/96.6		50/115		50/115		65/149.5	
	480V	50/115		50/115		50/115		50/115		65/149.5		65/149.5		75/172.5	
	240V	65/149.5		65/149.5		65/149.5		65/149.5		85/195.5		85/195.5		100/230	
JIS	550V AC	50/105		50/105		50/105		50/105		65/143		65/143		75/165	
	460V	65/143		65/143		65/143		65/143		85/195.5		85/195.5		100/230	
	220V	65/143		65/143		65/143		65/143		85/195.5		85/195.5		100/230	
	600V DC *5	40/40		40/40		40/40		40/40		40/40		40/40		40/40	
	250V	40/40		40/40		40/40		40/40		40/40		40/40		40/40	
NK 3-pole type only	690V AC 450V	50/115 65/153 (500V)		50/115 65/153 (500V)		50/115 65/153 (500V)		50/115 65/153 (500V)		65/153 85/201 (500V)		65/153 85/201 (500V)		75/179 100/245 (500V)	
LR, AB, GL, BV 3-pole type only	690V AC 450V	50/115 65/153 (500V)		50/115 65/153 (500V)		50/115 65/153 (500V)		50/115 65/153 (500V)		65/153 85/201 (500V)		65/153 85/201 (500V)		75/179 100/245 (500V)	
Rated impulse withstand voltage (U_{imp}) (kV)		12		12		12		12		12		12		12	
Rated short time withstand current (I_{cw}) (kA, rms)	1 sec.	65		65		65		65		85		85		100	
	3 sec.	50		50		50		50		65		65		85	
Rated latching current (kA, rms)		65		65		65		65		85		85		100	
Total fault clearing time (s)		0.03		0.03		0.03		0.03		0.03		0.03		0.03	
Closing time (s) max.	Spring charging time	10		10		10		10		10		10		10	
	Closing time	0.08		0.08		0.08		0.08		0.08		0.08		0.08	

Notes: ● Available – Not available
□ Replace the □ mark in the type number by the pole number code 3-pole: **3** 4-pole: **4**
■ Replace the ■ mark in the type number by the installation code Fixed: **P** Draw-out with cradle: **X** Draw-out with cradle and shutter: **Q**

*1 At ambient temperature of 40°C (or at ambient temperature of 45°C for marine use)
*2 The 2-pole ACBs are similar to 3-pole types except that the center pole contacts and conductor are omitted.
*3 1000V AC applies to IEC60947-2 and JIS C8201-2.
*4 690V AC applies to IEC60947-2 and JIS C8201-2.
*5 3-pole in series should be applied.

■ Specifications and ratings, high breaking types

Frame size		1250A		1600A		2000A		1600A		2000A		2500A		3200A	
Basic type		**DH12 □■H**		**DH16 □■H**		**DH20 □■H**		**DH16 □■P**		**DH20 □■P**		**DH25 □■P**		**DH30 □■P**	
No. of poles *2		3	4	3	4	3	4	3	4	3	4	3	4	3	4
Rated current (A) *1	IEC, EN, AS	1250		1600		2000		1600		2000		2500		3200	
	JIS	1250		1600		2000		1600		2000		2500		3200	
	NEMA, ANSI	1250		1600		2000		1600		2000		2500		3200	
	NK, LR, AB, GL, BV	1250		1600		2000		1600		2000		2500		3200	
Rated current of the neutral pole (A)		1250		1600		2000		1600		2000		2500		3200	
Rated primary current of overcurrent tripping device (I_{CT}) (A)		200		1600		2000		200		2000		2500		3200	
		400						400							
		800						800							
For general feeder circuit use		1250						1250							
								1600							
Rated primary current of overcurrent tripping device (I_n) (A)		$100 \leqq I_n \leqq 200$		$800 \leqq I_n \leqq 1600$		$1000 \leqq I_n \leqq 2000$		$100 \leqq I_n \leqq 200$		$1000 \leqq I_n \leqq 2000$		$1250 \leqq I_n \leqq 2500$		$1600 \leqq I_n \leqq 3200$	
		$200 < I_n \leqq 400$						$200 < I_n \leqq 400$							
		$400 < I_n \leqq 800$						$400 < I_n \leqq 800$							
For generator protection use		$630 < I_n \leqq 1250$						$630 < I_n \leqq 1250$							
I_n: Generator rated current								$800 < I_n \leqq 1600$							
Rated insulation voltage (U_i) (V, 50/60Hz) *3		1000		1000		1000		1000		1000		1000		1000	
Rated operational voltage (U_e)(V, 50/60Hz)*4		690		690		690		690		690		690		690	
Fixed type **P**		●		●		●		●		●		●		–	
Draw-out type with cradle **X**		●		●		●		●		●		●		●	
Draw-out type with cradle and shutter **Q**		●		●		●		●		●		●		●	
Main circuit terminal connection		vertical						vertical							
Mass (kg) For draw-out type X		79	94	79	94	79	94	105	125	105	125	105	125	105	125
Rated breaking capacity (kA, sym.)/ Rated making current (kA, peak)															
IEC, EN, AS [I_{CS}=I_{CU}]	690V AC	55/121		55/121		55/121		85/187		85/187		85/187		85/187	
	440V	80/176		80/176		80/176		100/220		100/220		100/220		100/220	
NEMA, ANS	600V AC	42/96.6		42/96.6		42/96.6		50/115		50/115		50/115		50/115	
	480V	65/149.5		65/149.5		65/149.5		80/184		80/184		80/184		80/184	
	240V	80/184		80/184		80/184		100/230		100/230		100/230		100/230	
JIS	550V AC	55/121		55/121		55/121		85/196		85/196		85/196		85/196	
	460V	80/176		80/176		80/176		100/230		100/230		100/230		100/230	
	220V	80/176		80/176		80/176		100/230		100/230		100/230		100/230	
	600V DC *5	40/40		40/40		40/40		40/40		40/40		40/40		40/40	
	250V	40/40		40/40		40/40		40/40		40/40		40/40		40/40	
NK	690V AC	55/128		55/128		55/128		85/201		85/201		85/201		85/201	
3-pole type only	450V	80/186		80/186		80/186		100/233		100/233		100/233		100/233	
LR, AB, GL, BV	690V AC	55/128		55/128		55/128		85/201		85/201		85/201		85/201	
3-pole type only	450V	80/186		80/186		80/186		100/233		100/233		100/233		100/233	
Rated impulse withstand voltage (U_{imp}) (kV)		12		12		12		12		12		12		12	
Rated short time withstand current	1 sec.	80		80		80		100		100		100		100	
(I_{cw}) (kA, rms)	3 sec.	55		55		50		75		75		75		75	
Rated latching current (kA, rms)		65		65		65		85		85		85		85	
Total fault clearing time (s)		0.03		0.03		0.03		0.03		0.03		0.03		0.03	
Closing time Spring charging time		10		10		10		10		10		10		10	
(s) max. Closing time		0.08		0.08		0.08		0.08		0.08		0.08		0.08	

Notes: ● Available – Not available
□ Replace the □ mark in the type number by the pole number code 3-pole: **3** 4-pole: **4**
■ Replace the ■ mark in the type number by the installation code Fixed: **P** Draw-out with cradle: **X** Draw-out with cradle and shutter: **Q**

*1 At ambient temperature of 40°C (or at ambient temperature of 45°C for marine use)
*2 The 2-pole ACBs are similar to 3-pole types except that the center pole contacts and conductor are omitted.
*3 1000V AC applies to IEC60947-2 and JIS C8201-2.
*4 690V AC applies to IEC60947-2 and JIS C8201-2.
*5 3-pole in series should be applied.

DH series
Type number nomenclature

■ Type number nomenclature

DH 08 3 X H - M 11LAL F □

① Basic type

② Frame size
- 08: 800A
- 12: 1250A
- 16: 1600A
- 20: 2000A
- 25: 2500A
- 30: 3200A
- 40: 4000A

③ Number of poles
- 3: 3-pole
- 4: 4-pole

④ Installation
- P: Fixed
- X: Draw-out with cradle
- Q: Draw-out with cradle & shutter

⑤ Interrupting capacity class
- Blank: Standard
- H: High
- P: Super High

⑥ Closing mechanism
- T: Manual-spring
- M: Motor-spring

ex.M = 100VDC: for motor 100 to 100VDC

⑦ Overcurrent release device
- 11LAL: Standard (LT, ST, INST/MCA)
- 11LGL: Std. Plus GF

(For details, see page 9.)

⑧ Tripping device
- F: Shunt trip ex. F = 100VDC
- R^1: Undervoltage trip/Inst.
- R^2: Undervoltage trip/Time delay

⑨Detailed specifications

Specify any additional requirements, such as overseas standards compliance, special environmental usage, or accessories, when ordering. Also clearly indicate the applicable standards, main circuit voltage, and breaking current. See the tables below.
ex. IEC 440VAC 65kA

Applied standard	Ordering code
IEC	IEC
EN	EN
AS	AS
NEMA	NEMA
ANSI	ANSI

Special environment specification	Ordering code
Tropical uses	Tropical
Extremely cold use storage -40°C operating -25°C	Extremely cold
Anti-corrosion treatment	Anti-corrosion

Optional accessories	Ordering code
Auxiliary switch (7c)	Auxiliary switch (7c)
Auxiliary switch (10c)	Auxiliary switch (10c)
Auxiliary switch (7c) for general 4c, for low level circuits 3c	Auxiliary switch 4c + 3c
Auxiliary switch (10c) for general 7c, for low level circuits 3c	Auxiliary switch 7c + 3c
Control circuit screw terminal	Control circuit screw terminal
Open (off) padlock	Open (off) padlock
Automatic closing spring release device	Automatic closing spring release device
Continuously – rated shunt trip device	AVR-1C
Capacitor trip device	AQR-1
Undervoltage (instantaneous) trip device	AUR-1BS
Undervoltage (500ms time delay) trip device	AUR-1BD
Control circuit safety shutter	Control circuit safety shutter
Position switches	ALR-☐P
Test jumper	Test jumper
Mis – insertion protection device	Mis – insertion protection device
Breaker fixing bolts	Breaker fixing bolts
Door interlock	Door interlock
Key lock	Key lock
Key interlock	Key interlock
Mechanical interlock	Mechanical interlock
Manual reset device	Manual reset device
IP55 cover	IP55 cover
Control circuit terminal cover	Control circuit terminal cover
Earthing device	Earthing device
Arc barrier	Arc barrier
Door flange	Door flange

External accessories	Ordering code
CT for neutral line 800 to 1600A frame	CW80-40LS
CT for neutral line 2000 to 4000A frame	EC160-40LS
Power transformer	TSE-40LS
Lifter	AWR-1 (DH08 to DH30), AWR-2 (DH08 to DH40)
OCR checker	ANU-1

■ Combination of overcurrent tripping device and indicator

Application and characteristic		Type number	Protection function: Long time delay, Short time delay, Instantaneous	Pre-alarm	Ground fault	Earth leakage	Reverse power	Under voltage	Output indication: 1-contact for any trip	Individual contacts	Spring charge	Trip	N phase protection	Contact temperature monitoring
General feeder protection	L	**11LAL**	●						●		▲	▲	●	
		11LGL	●		●				●		▲	▲	●	
		11LPS	●	●						●	▲	▲	●	
		11LPG	●	●	●					●	▲	▲	●	
		21LPS	●	●						●	●	●	●	●
		21LPGU	●	●	●			●		●	●	▲*	●	●
		21LPEL	●	●		●				●	●	●	●	●
		21LPEM	●	●		●				●	●	●	●	●
	R	**11RAL** □	●						●		▲	▲	●	
		11RGL □	●		●				●		▲	▲	●	
		11RPS □	●	●						●	▲	▲	●	
		11RPG □	●	●	●					●	▲	▲	●	
		21RPG □	●	●	●			●		●	●	▲*	●	
Generator protection	S	**11SAL**	●						●		▲	▲		
		11SPS	●	●						●	▲	▲		
		21SPSU	●	●				●		●	●	▲*		●
		21SPRU	●	●			●	●		●	●	▲*		●
		21STRU	●	●			●	●		●		▲*		●

Notes: ● Provided ▲ Optional

□ Replace the □ mark in the type number by the following protective characteristic numbers (1 to 5).

$1^{0.02}$ T: **1** IT: **2** I^2T: **3** I^3T: **4** I^4T: **5**

* Either trip output indicator or undervoltage tripping device is available.

▲ When ordering the optional accessories, add the following codes to end of type number.

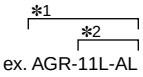
Spring charge indicator: spring charge

Trip indicator: trip

N phase protection: N

Contact temperature monitoring: O

Over-current trip device type/code



ex. AGR-11L-AL

✻1 AGR-11L-AL: Over current trip device only

✻2 11LAL: ACB with the overcurrent trip device

■ Ordering information

Specify the following:

1. Type number
2. Applied standard
3. Main circuit voltage and breaking capacity
4. Optional accessories for main device and OCR
5. Voltage of each device
6. External accessories

■ Characteristics of overcurrent trip device

For general feeder circuit/L-characteristic (Type AGR-11L, 21L)

Protection function		Setting range
Adj. long time delay LT	Pick-up current I_R (A)	I_nX (0.8 — 0.85 — 0.9 — 0.95 — <u>1.0</u> — 1.05 — 1.1 — NON), 8 steps • NON-tripping at I_R X 1.05 or less • Tripping between 1.05I_R and 1.2I_R
	Time delay T_R (s) Tolerance of T_R (%)	(0.5 — 1.25 — 2.5 — 5 — 10 — 15 — 20 — 25 — 30) at 600% X I_R, 9 steps ±15% +150ms -0ms
Adj. short time delay ST	Pickup current I_{Sd} (A) Tolerance of T_{Sd} (%)	I_nX (1 — 1.5 — 2 — 2.5 — 3 — 4 — <u>6</u> — 8 — 10 — NON), 10 steps ±15%
	Time delay T_{Sd} (ms) Relay time (ms) Resettable time (ms) Total fault clearing time (ms)	 50 100 200 400 600 800, 6steps 25 75 175 375 575 775 120 170 270 470 670 870
Adj. instantaneous trip INST or MCR	Pick-up current I_i (A) Tolerance (%)	I_nX (2 — 4 — 6 — 8 — 10 — 12 — 14 — <u>16</u> — NON), 9 steps ±20%
Adj. pre-trip alarm PTA	Pick-up current I_{P1} (A) Tolerance of I_{P1} (%) Time delay T_{P1} (S) Tolerance of T_{P1} (%)	I_n X (0.75 — 0.8 — 0.85 — 0.9 — <u>0.95</u> — 1.0), 6 steps ±7.5% (5 —10 — 15 — 20 — 40 — 60 — 80 — <u>120</u> — 160 — 200) at I_{P1} or more, 10 steps ±15% +100ms -0ms
Adj. ground fault trip GF	Pick-up current I_g (A) Tolerance of I_g (%)	I_{CT} X (0.1 — <u>0.2</u>— 0.3 — 0.4 — 0.6 — 0.8 — 1.0— NON), 8 steps ±20%
	Time delay T_g (ms) Relay time (ms) Resettable time (ms) Total fault clearing time (ms)	 100 200 <u>300</u> 500 1000 2000 , 6steps 75 175 275 475 975 1975 170 270 370 570 1070 2070
Neutral phase protection function NP	Pick-up current I_N (A)	I_{CT} X (<u>0.4</u> — 0.5 — 0.63 — 0.8 — 1.0) Factory set to a user-specified value • Non-tripping at 1.05 I_N or less • Tripping range: (1.05 to 1.2) I_N
	Time delay T_N (S) Tolerance of T_N (%)	Long time delay (LT) trip at 600% of I_N ±15% +150ms -0ms
Adj. earth leakage trip ELT	Pick-up current $I_{\Delta R}$ (A) Current setting tolerance(%)	0.2 — 0.3 — <u>0.5</u> — 1.0 (Medium sensitivity) or 3 — <u>5</u> (Low sensitivity) • Non operate below 50% of $I_{\Delta R}$, Operate between 50% and 100% of $I_{\Delta R}$
	Time delay $t_{\Delta R}$ (ms) Relay time (ms) Resettable time (ms) Max. total clearing time (ms)	 100 200 300 500 1000 2000 , 6 steps 50 150 250 450 950 1950 250 350 450 600 1150 2150
Undervoltage trip UVT (AGR21only)	Pick-up voltage (V)	UVT rated supply voltage U_C X (0.8 — <u>0.85</u> — 0.9 — 0.95), 4 steps
	Time delay time (S)	0 — 0.1 — 0.2 — 0.3 — 0.4 — <u>0.5</u> — 0.6 — 0.7 — 0.8 — 1.0, 10 steps
Control power		100 to 120VAC 200 to 240VAC common; 100 to 125VDC 200 to 250VDC common; 24VDC 48VDC common
		Power consumption: 5VA

___ : Default setting

■ Values of [I_{CT}] and [I_n]

Type	Applicable [I_{CT}] (A)	Rated current [I_n](A) [I_{CT}] X 0.5	[I_{CT}] X 0.63	[I_{CT}] X 0.8	[I_{CT}] <u>X 1.0</u>
DH08	**200**	100	125	160	200
	400	200	250	320	400
	800	400	500	630	800
DH12	**400**	200	250	320	400
	800	400	500	630	800
	1250	630	800	1000	1250
DH16	**400**	200	250	320	400
	800	400	500	630	800
	1250	630	800	1000	1250
	1600	800	1000	1250	1600

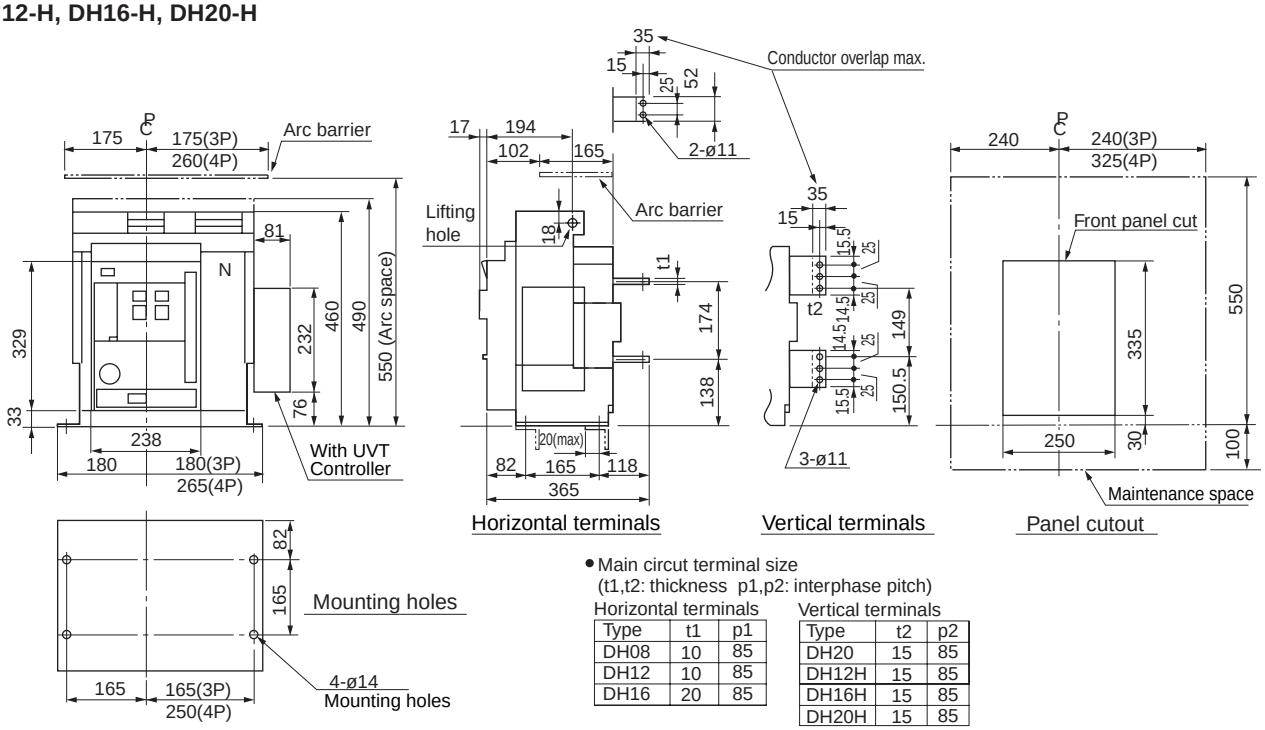
Type	Applicable [I_{CT}] (A)	Rated current [I_n](A) [I_{CT}] X 0.5	[I_{CT}] X 0.63	[I_{CT}] X 0.8	[I_{CT}] <u>X 1.0</u>
DH20	**400**	200	250	320	400
	800	400	500	630	800
	1250	630	800	1000	1250
	1600	800	1000	1250	1600
	2000	1000	1250	1600	2000
DH25	**2500**	1250	1600	2000	2500
DH30	**3200**	1600	2000	2500	3200
DH40	**4000**	2000	2500	3200	4000

Type	Applicable [I_{CT}] (A)	Rated current [I_n](A) [I_{CT}] X 0.5	[I_{CT}] X 0.63	[I_{CT}] X 0.8	[I_{CT}] X 1.0
DH12-H	**200**	100	125	160	200
	400	200	250	320	400
	800	400	500	630	800
	1250	630	800	1000	1250
DH16-H	**1600**	800	1000	1250	1600
DH20-H	**2000**	1000	1250	1600	2000
DH16-P	**200**	100	125	160	200
	400	200	250	320	400
	800	400	500	630	800
	1250	630	800	1000	1250
	1600	800	1000	1250	1600
DH20-P	**2000**	1000	1250	1600	2000
DH25-P	**2500**	1250	1600	2000	2500
DH30-P	**3200**	1600	2000	2500	3200

___ : Default setting

■ Dimensions, mm

• Fixed types
DH08, DH12, DH16, DH20
DH12-H, DH16-H, DH20-H



• Main circut terminal size
(t1,t2: thickness p1,p2: interphase pitch)

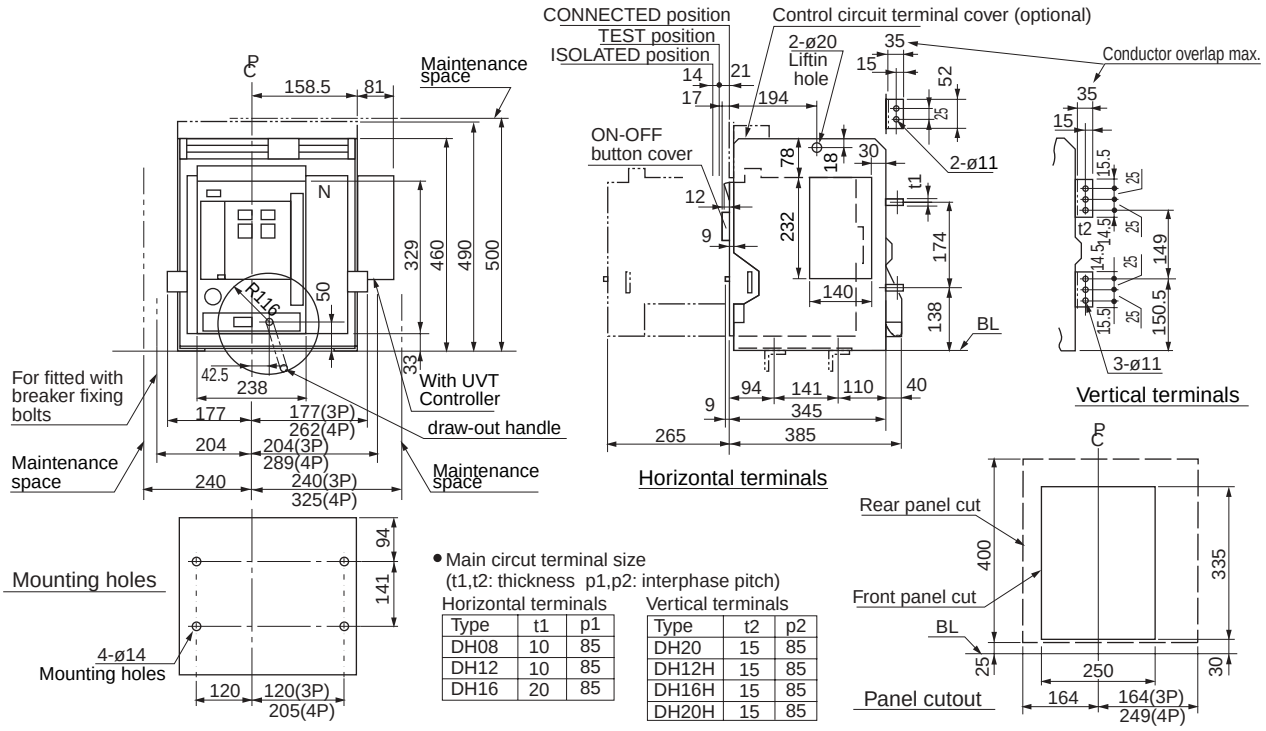
Horizontal terminals

Type	t1	p1
DH08	10	85
DH12	10	85
DH16	20	85

Vertical terminals

Type	t2	p2
DH20	15	85
DH12H	15	85
DH16H	15	85
DH20H	15	85

• Draw-out types
DH08, DH12, DH16, DH20
DH12-H, DH16-H, DH20-H



• Main circut terminal size
(t1,t2: thickness p1,p2: interphase pitch)

Horizontal terminals

Type	t1	p1
DH08	10	85
DH12	10	85
DH16	20	85

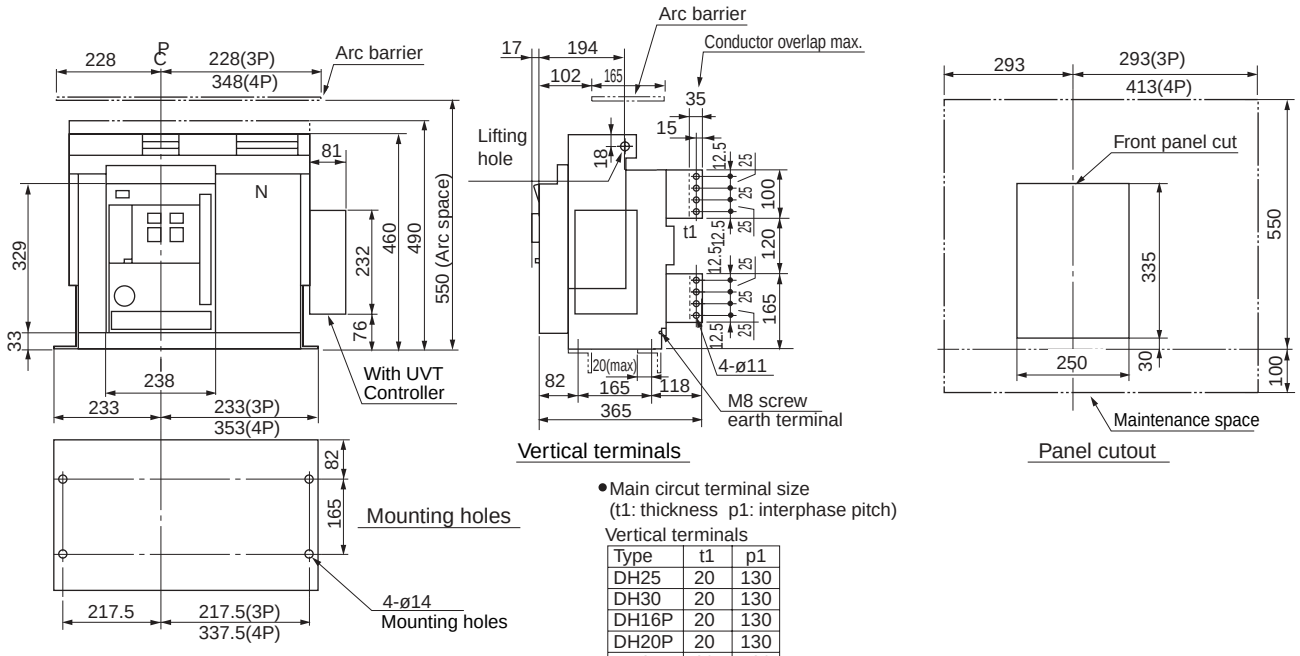
Vertical terminals

Type	t2	p2
DH20	15	85
DH12H	15	85
DH16H	15	85
DH20H	15	85

DH series
Dimensions

■ Dimensions, mm

• Fixed types
DH25, DH30
DH16-P, DH20-P, DH25-P, DH30-P

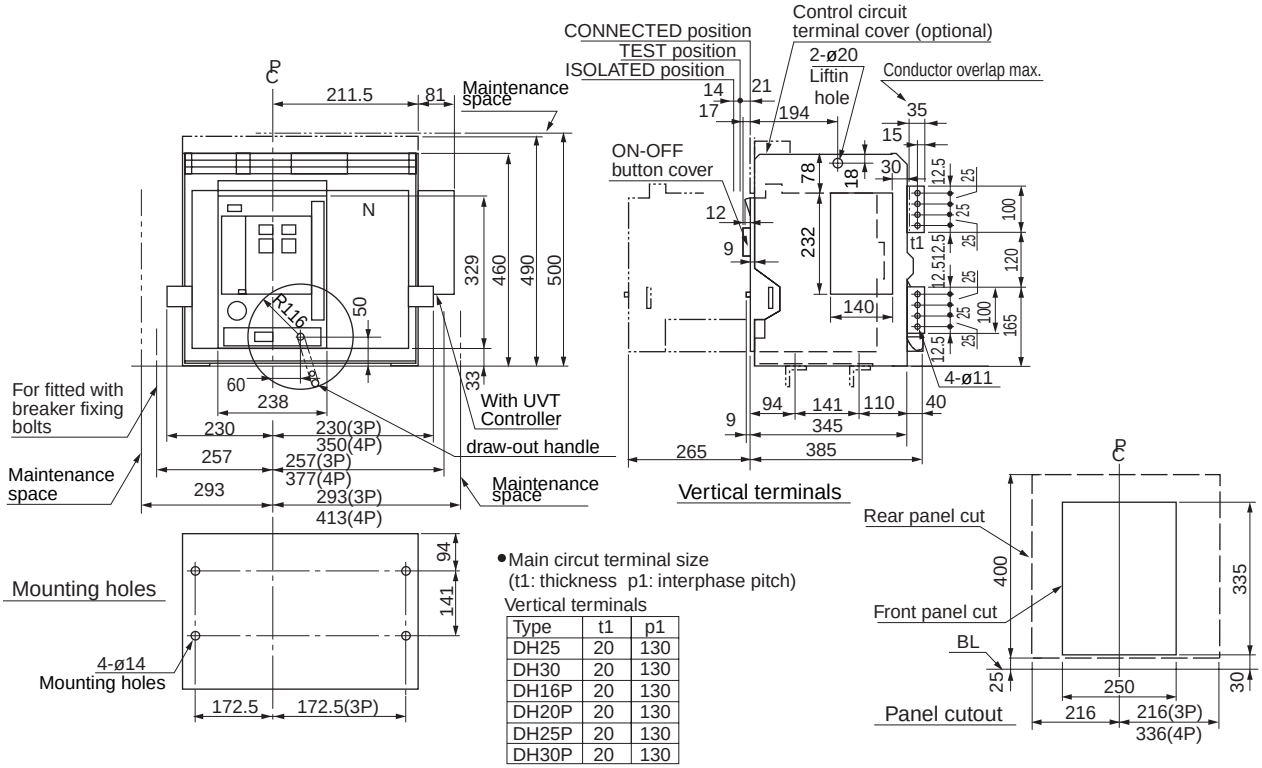


●Main circut terminal size
(t1: thickness p1: interphase pitch)

Vertical terminals

Type	t1	p1
DH25	20	130
DH30	20	130
DH16P	20	130
DH20P	20	130
DH25P	20	130
DH30P	20	130

• Draw-out types
DH25, DH30
DH16-P, DH20-P, DH25-P, DH30-P



●Main circut terminal size
(t1: thickness p1: interphase pitch)

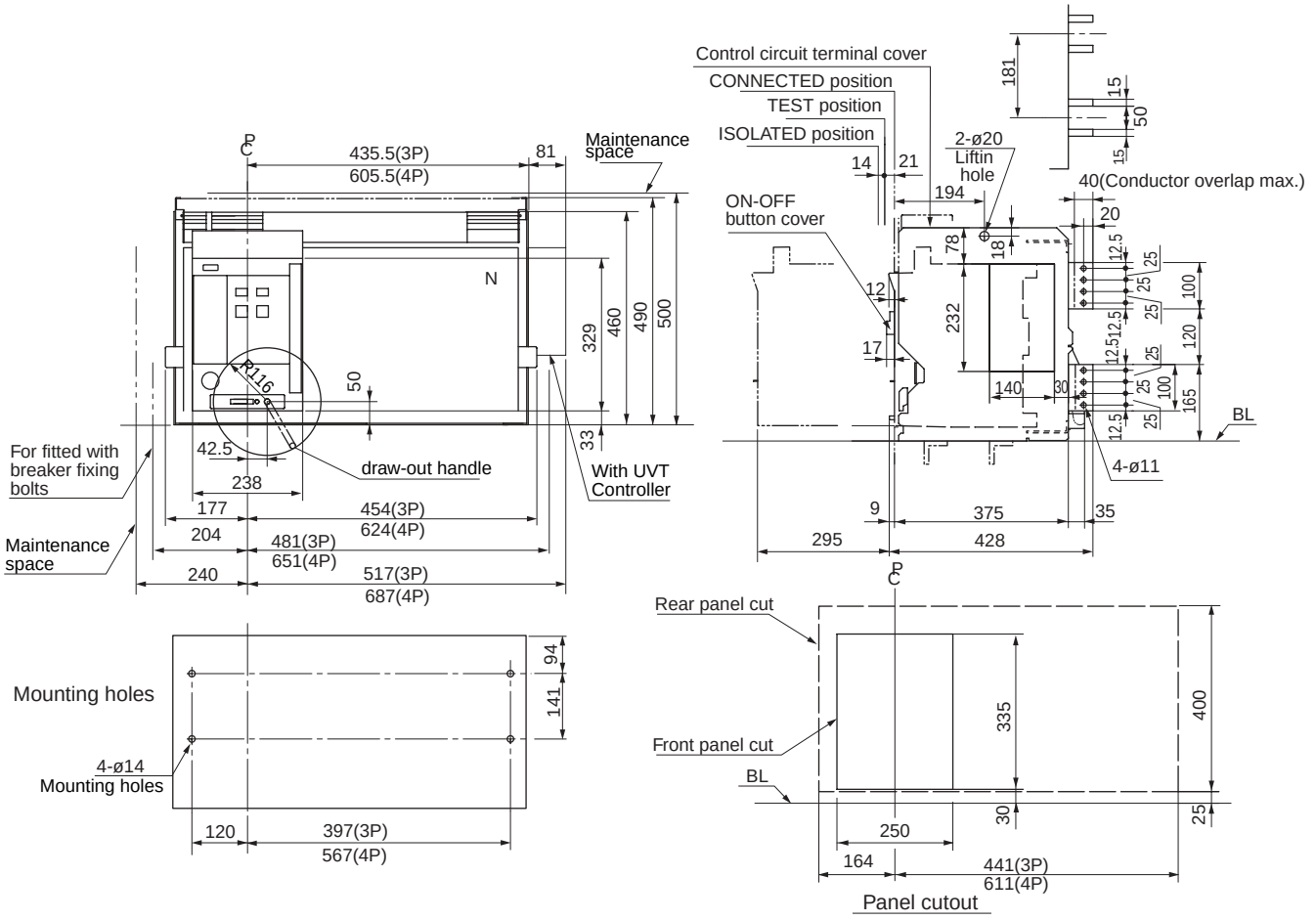
Vertical terminals

Type	t1	p1
DH25	20	130
DH30	20	130
DH16P	20	130
DH20P	20	130
DH25P	20	130
DH30P	20	130

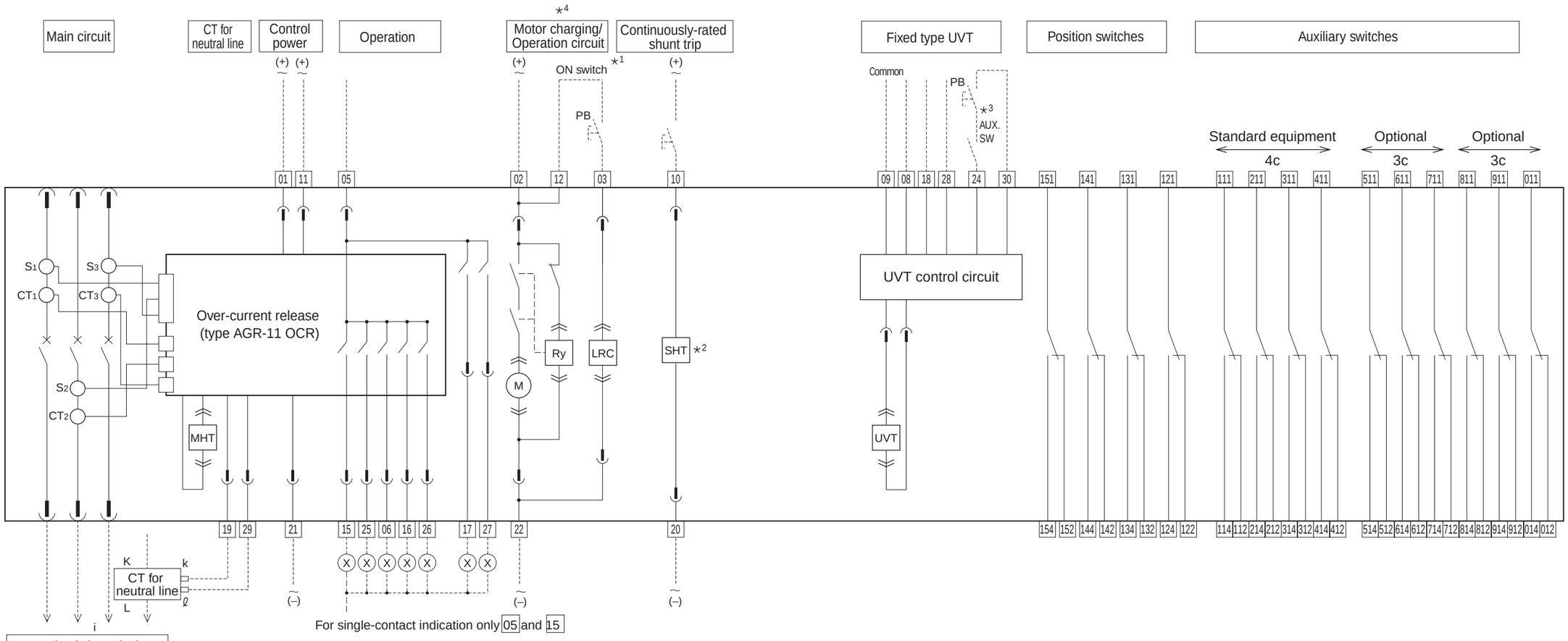
■ **Dimensions, mm**

• **Draw-out types**

DH40



■ **Wiring diagrams**



Terminal description

Check OCR voltage before connecting

01 21 Control power supply AC200 - 240V,DC200 - 250V,DC48V 01 11 Control power supply AC100 - 120V
11 21 Control power supply DC100 -125V,DC24V
02 22 Control power supply AC10 - 240V,DC100 - 220V,DC24V,DC48V 12 Operation switch,common 03 ON switch
05 Operation indication terminal,common 15 LT trip indication or single-contact indication 25 St/INST trip indication 06 PTA indication
16 GF trip indication 26 System alarm indication 17 trip indication 27 Spring charge indication 10 20 Cotinuously-rated shun trip
19 Separate CT for neutral line (k) 29 Separate CT for neutral line (ℓ) 08 ,18 , 28 UVT power supply 09 UVT power supply common

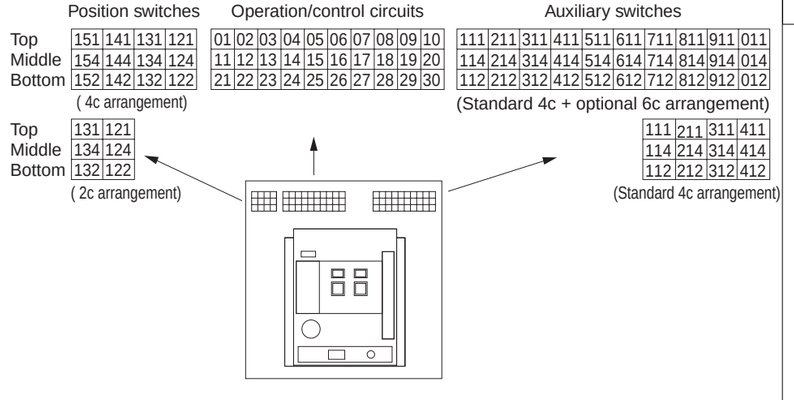
UVT power supply

Terminal No.	100V AC coil	200V AC coil	400V AC coil
08 - 09	100V	200V	380V
18 - 09	110V	220V	415V
28 - 09	120V	240V	440V

Symbols for accessories

CT1 - CT3 : Power CTs
S1 - S3 : Current sensors
M : Charging motor
LRC : Latch release coil
MHT : Magnetic Hold Trigger
Isolating terminal connector (for draw-out type)
Manual connector
User wiring
Relay or indicator lamp

∗1 : Do not connected "b" contact of auxiliary switch to ON switch in series, otherwise, pumping may occur.
∗2 : Wiring diagrams changes for capacitor trip.
∗3 : Use "a" contact of auxiliary switch of ACB.
∗4 : For motor split circuit, terminals 02 , 22 and 03, 04 are used for charging operation respectively.



Designation of terminals for auxiliary and position switches

∗ ∗ ∗
1: Common, 2: b-contact, 4: a-contact
1: Auxiliary switch
2: Position switch (for CONNECTED)
3: Position switch (for TEST)
4: Position switch (for ISOLATED)
5: Position switch (for INSERT)
1 – 0: Switch numbers
A, B, C: Auxiliary switches for microload

CONNECTED position : 121–124 ON
121–122 OFF
TEST position : 131–134 ON
131–132 OFF
ISOLATED position : 141–144 ON
141–142 OFF
INSERT position : 151–154 ON
151–152 OFF

■ Accessories

Supplied accessories

Auxiliary switch (4c)
ON - OFF operation counter
Indicator cover
Lifting hole (Draw-out type)
Lifting plate (Draw-out type)

Optional accessories

• Auxiliary switch (Rated)

Category	For general service		For microload		
Voltage	Resistive load (A)	Inductive load (A) AC: cos ø ≥ 0.3 DC: L/R ≤ 0.01	Resistive load (A)	Inductive load (A) AC: cos ø ≥ 0.6 DC: L/R ≤ 0.007	Min. applicable load
100 to 250VAC	5	5	0.1	0.1	5VDC 1mA
251 to 500VAC	5	5	–	–	
30VDC	1	1	0.1	0.1	
125 to 250VDC	1	1	–	–	

Notes: The chattering of b-contacts due to ON - OFF operation of the ACB lasts for less than 20ms.
Do not supply different voltages to contacts of switch.

• Capacitor trip switch

Item	Specifications
Type	AQR-1
Rated voltage	100 to 120VAC
Operational voltage	Rated voltage X 70 to 110%
Rated frequency	50/60Hz
Rated voltage of shunt trip used	480VDC
Power consumption	100VA

■ Contact ratings for operation indications (for AGR-11, 21)

Voltage (V)		Current (A)			
		Single contact		Individual contacts	
		Resistive load	Inductive load	Resistive load	Inductive load
AC	250	8	3	0.5	0.2
DC	250	0.3	0.15	0.27	0.04
	125	0.5	0.25	0.5	0.2
	30	5	3	2	0.7

■ Contact ratings of Trip indicator for use with AGR-11or without OCR

Voltage (V)		Switch contact ratings (A)	
		Resistive load	Inductive load
AC	250	6	3
DC	250	0.1	0.1
	125	0.5	0.5
	30	3	3

Position switch

• Position switch ratings

Voltage	Resistive load (A)	Inductive load (A) (cos ø = 0.6, L/R = 0.07)
AC 100-250V	11	6
DC 250V	0.3	0.3
DC 125V	0.6	0.6
DC 30V	6	5
DC 8V	10	6

Type	Number of contacts	Contact arrangement			
		INSERT	ISOLATED	TEST	CONN
ALR-0110P	2c	0	1	1	0
ALR-0101P		0	1	0	1
ALR-0011P		0	0	1	1
ALR-0200P		0	2	0	0
ALR-0020P		0	0	2	0
ALR-0002P		0	0	0	2
ALR-1111P	4c	1	1	1	1
ALR-1210P		1	2	1	0
ALR-1201P		1	2	0	1
ALR-0211P		0	2	1	1
ALR-1120P		-1	1	2	0
ALR-1021P		1	0	2	1
ALR-0121P		0	1	2	1
ALR-1102P		1	1	0	2
ALR-1012P		1	0	1	2
ALR-0112P		0	1	1	2
ALR-0220P		0	2	2	0
ALR-0202P		0	2	0	2
ALR-0022P		0	0	2	2
ALR-1030P		1	0	3	0
ALR-0130P		0	1	3	0
ALR-0031P		0	0	3	1
ALR-1003P		1	0	0	3
ALR-0103P		0	1	0	3
ALR-0013P		0	0	1	3
ALR-0040P		0	0	4	0
ALR-0004P		0	0	0	4

⚠ Safety Considerations

- For safe operation, before using the product read the instruction manual or user manual that comes with the product carefully or consult the Fuji sales representative from which you purchased the product.
- Products introduced in this catalog have not been designed or manufactured for such applications in a system or equipment that will affect human bodies or lives.
- Customers, who want to use the products introduced in this catalog for special systems or devices such as for atomic-energy control, aerospace use, medical use, passenger vehicle, and traffic control, are requested to consult the Fuji sales division.
- Customers are requested to prepare safety measures when they apply the products introduced in this catalog to such systems or facilities that will affect human lives or cause severe damage to property if the products become faulty.
- For safe operation, wiring should be conducted only by qualified engineers who have sufficient technical knowledge about electrical work or wiring.

Fuji Electric FA Components & Systems Co., Ltd.

Gate City Ohsaki, East Tower
11-2, Osaki 1-chome, Shinagawa-ku, Tokyo, 141-0032, Japan

Phone: +81-3-5435-7135~8
Fax: +81-3-5435-7456~9
URL http://www.fujielectric.co.jp/fcs/eng

Printed on 100% recycled paper using soy-based ink

Information in this catalog is subject to change without notice.

Printed in Japan 2004-2 L30 FIS